IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re application of:	Trung T. Doan	Group Art Unit: 1763
Serial No.:	09/652,713	Examiner: Sylvia MacArthur
Filed:	August 31, 2000	Atty. Docket: 93-0421.04
For:	CHEMICAL DISPENSING SYSTEM FOR SEMICONDUCTOR WAFER PROCESSING	

SHOWING OF FACTS AND RESPONSE TO THE BOARD DECISION DATED JULY 29, 2003

Mail Stop Patent Application
Commissioner for Patents
P.O. Box 1450
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9/26/03 Susan Jerome
Date Signature

Dear Sir:

Pursuant to 37 C.F.R. 1.196(b), Applicant herein presents facts not previously of record and respond to the Board's decision dated July 29, 2003.

I. Showing of facts

Applicant acknowledges that the showing of facts "may" include affidavits or declarations. (MPEP §1214.01.) However, in the interest of efficient prosecution, Applicant contends that the

(*Id.* at p. 242. A copy of the relevant page of MERRIAM WEBSTER is included in an appendix to this Response.)

B. The AMERICAN HERITAGE ELECTRONIC DICTIONARY (1992) defines "configure" as

> [t]o design, arrange, set up, or shape . . . .

(A printout of the relevant definition from the ELECTRONIC DICTIONARY is included in an appendix to this Response.)

C. The patents listed below state as follows.

1. U.S. Pat. No. 6,311,365 by Dornier states

> [w]hen, as is particularly preferred, the steam cleaning head has a delta shape with slightly rounded sides, steam pressure chambers are again arranged side by side along the edge portion and are followed radially on the inside by a suction region. This suction region is defined by a circular annular arrangement of further steam pressure chambers in the interior of which a suction region is again found.

(Dornier at col. 2, ln. 31-37.)

2. European Pat. No. 1238766 by Caspar states

> [i]t should be understood that the amount of suction applied to the suction apertures depends on the shape and size of the apertures which preferably are round.

(Caspar at ¶[0013].)

3. U.S. Pat. No. 6,341,387 by Zars states

> [a]n additional object of the present invention is that it may be installed as a "kit" on virtually any pool, whether new or existing.

> The invention is intended to be self-contained and made of materials familiar in the art, preferably polyvinyl chloride (PVC) piping, The (sic) exact limiting quantity of suction is determined by the internal dimensions and arrangement of the piping and sump.

(Zars at col. 2, ln. 41-47.)

4. U.S. Pat. No. 4,938,239 by Theurer states

> [t]his advantageous combination of the compressed air discharging nozzle and the suction inlet port results in a reinforced suction air flow because the path of this flow is exactly determined by the arrangement of the nozzle within the inlet port so that all the dirt is subjected to the downward pressure of the compressed air as well as the upward suction, which will cause a strong turbulence and detach even strongly adhering dirt particles from the ballast.

(Theurer at col. 3, ln. 30-38.)

5. U.S. Pat. No. 4,522,575 by Tischer states

> the discharge pressure and suction pressure are easily determined design parameters . . .

(Tischer at col. 6, ln. 14-16.)

6. U.S. Pat. No. 3,939,065 by Einersson states

> [t]he strength of the pressure and suction waves depends, besides by the design of the pulsation organs, mainly on the peripheral velocity of the drum relative to the peripheral velocity of the suspension in the liquid layers in question.

(Einersson at col. 2, ln. 41-45.)

(Copies of these patents are included in appendices to this Response.)

II. Argument

Claims 36-37 are pending.

Claims 36-37 are appealed.

Claims 36-37 are rejected by the Board based on a new ground – §112, ¶2.

Applicant requests the Examiner consider the definiteness of the pending claims.

The Board's decision dated July 29, 2003 reversed the Examiner's §102 rejection and raised a §112, ¶2 indefiniteness rejection. In doing so, the Board focused on independent claim 36's limitations concerning a splash controller that is (1) configured to draw a chemical toward itself; and (2) configured to generate a gas pressure. The Board specifically argued that *suction* applied *through* the splash controller, rather than the *configuration* of the splash controller, is what draws the chemical and generates the gas pressure. (Appeal Decision at p. 4-5.) Significantly, in support for this argument, the Board interpreted the term "configured" to mean "shaped." (***Id***. at p. 4.) As authority for this interpretation, the Board cited page 242 of MERRIAM WEBSTER'S COLLEGIATE DICTIONARY (10th ed.). (Appeal Decision at p. 4, footnote 1.) However, as cited above in part IA, that reference appears to offer a different definition. Specifically, the definition of the root word "configure" indicates that "configured" means "set up for operation." Moreover, the alternate source cited above in part IB indicates that the term "configured" is broad enough to encompass MERRIAM WEBSTER'S actual definition, the Board's stated definition, and more. Namely, the ELECTRONIC DICTIONARY's definition of the root word indicates that "configured" broadly means "designed, arranged, set up, or shaped."

Moreover, one of ordinary skill in the art would be aware that suction is a function of the design, arrangement, set up, or shape (i.e. configuration) of a relevant device, as demonstrated by the patents cited above in part IC. For example, U.S. Pat. No. 6,311,365 by Dornier teaches that a "suction region" is defined by an "arrangement" of pressure chambers. (Dornier at col. 2, ln. 35-36.) European Pat. No. 1238766 by Caspar indicates that "the amount of suction applied" depends on the "shape" of a device's apertures. (Caspar at ¶[0013].) U.S. Pat. No. 6,341,387 by Zars discloses that a "quantity of suction" is determined by the internal dimensions and "arrangement" of piping. (Zars at col. 2, ln. 45-47.) U.S. Pat. No. 4,938,239 by Theurer instructs one of ordinary skill in the art that the path of a "suction air flow" is determined by an

"arrangement" of a nozzle with an inlet port. (Theurer at col. 3, ln. 32-34.) U.S. Pat. No. 4,522,575 by Tischer discloses that "suction pressure" is a "design" parameter. (Tischer at col. 6, ln. 14-16.) U.S. Pat. No. 3,939,065 by Einersson indicates that the strength and press of "suction waves" depends in part upon the "design" of pulsation devices. (Einersson at col. 2, ln. 41-43.) Applicant contends that such knowledge is deemed to be imparted to one of ordinary skill in the art when considering the Specification's support for the definiteness of the terms at-issue.

Further, the Specification in fact provides non-limiting support for designs/arrangements/set ups/shapes of splash controllers. Applicant cited the relevant portions in the Appeal Brief when summarizing the invention. (Appeal Brief at p. 2.) To reiterate, Applicant cited p. 3, ln. 18-19; p. 4, ln. 5-6; and FIGS. 1&2 (addressing vacuum port 18) for the general disclosure of a splash controller. For the specific limitation of a splash controller configured to draw the chemical toward itself, Applicant cited p. 4, ln. 3-5, 16-18 (addressing how the design/arrangement/set up/shape of vacuum port 18 allows application of suction to a particular area). For the specific limitation of a splash controller configured to generate the relevant gas pressure, Applicant cited p. 3, ln. 3-7, 16-18; and FIGS. 1&2. Applicant alerts the Examiner that p. 4, ln. 3-7, 16-18 are relevant to this limitation as well.

In addition, it is significant that the Board has acknowledged that suction draws the relevant chemical and generates the relevant gas pressure (and that the Specification discloses so). (*See* Appeal Decision at p. 5-6.)

Hence, because the Specification discloses a splash controller configured (i.e. designed, arranged, set up, or shaped) for suction; and suction draws the relevant chemical and generates the relevant gas pressure; then the Specification necessarily discloses a splash controller configured to draw the relevant chemical and generate the relevant gas pressure.

(Moreover, for reasons addressed in Appeal Brief, Hurtig cannot be interpreted as disclosing a component whose design, arrangement, set up, and/or shape meets claim 36's relevant configuration requirements. See Appeal Brief at p. 3-4.)

As a result, Applicant contends the claims meet §112's definiteness requirement and requests the Examiner's allowance of all of the pending claims. If there are any matters which

may be resolved or clarified through a telephone interview, the Examiner is requested to contact Applicant's undersigned attorney at the number indicated.

Respectfully submitted,

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Date: 9/26/13

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FORM: PTO-1449 (REV: 7-80)	U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	Atty Docket No: **93-0421.04**	Serial No: **09/652,713**
	SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Applicant: **Trung T. Doan**	
(37 CFR 1.98(b))	*(use several sheets if necessary)*	Filing Date: **August 31, 2000**	Group: **1763**

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Subclass	
	AA	4,314,022	02/02/1982	Fisch	430	326	
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation Yes	Translation No
	AL						☐	☐
	AM						☐	☐

Initial			**OTHER ART** (including author, title, date, pertinent pages, etc.)
	AN		
	AO		

Examiner:	Date Considered:

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication with applicant.

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Merriam-Webster's Collegiate® Dictionary

TENTH EDITION

Merriam-Webster, Incorporated
Springfield, Massachusetts, U.S.A.

mind or a manner marked by easy coolness and freedom from uncertainty, diffidence, or embarrassment. CONFIDENCE stresses faith in oneself and one's powers without any suggestion of conceit or arrogance ⟨the *confidence* that comes from long experience⟩. ASSURANCE carries a stronger implication of certainty and may suggest arrogance or lack of objectivity in assessing one's own powers ⟨handled the cross-examination with complete *assurance*⟩. SELF-POSSESSION implies an ease or coolness under stress that reflects perfect self-control and command of one's powers ⟨answered the insolent question with complete *self-possession*⟩. APLOMB implies a manifest self-possession in trying or challenging situations ⟨handled the reporters with great *aplomb*⟩.

²confidence *adj* (1849) : of, relating to, or adept at swindling by false promises ⟨a ~ game⟩ ⟨a ~ man⟩

confidence interval *n* (1934) : a group of continuous or discrete adjacent values that is used to estimate a statistical parameter (as a mean or variance) and that tends to include the true value of the parameter a predetermined proportion of the time if the process of finding the group of values is repeated a number of times

confidence limits *n pl* (1939) : the end points of a confidence interval

con-fi-dent \'kän-fə-dənt, -ˌdent\ *adj* [L *confident-*, *confidens*, fr. prp. of *confidere*] (1576) **1** : characterized by assurance; *esp* : SELF-RELIANT **2** *obs* : TRUSTFUL, CONFIDING **3 a** : full of conviction : CERTAIN **b** : COCKSURE — **con-fi-dent-ly** *adv*

con-fi-den-tial \ˌkän-fə-'den(t)-shəl\ *adj* (1759) **1** : marked by intimacy or willingness to confide ⟨a ~ tone⟩ **2** : PRIVATE, SECRET ⟨~ information⟩ **3** : entrusted with confidences ⟨~ clerk⟩ **4** : containing information whose unauthorized disclosure could be prejudicial to the national interest — compare SECRET, TOP SECRET — **con-fi-den-tial-i-ty** \-ˌden(t)-shē-'a-lə-tē\ *n* — **con-fi-den-tial-ly** \-'den(t)-sh(ə-)lē\ *adv*

con-fid-ing \kən-'fī-diŋ\ *adj* (1829) : tending to confide : TRUSTFUL — **con-fid-ing-ly** \-diŋ-lē\ *adv* — **con-fid-ing-ness** *n*

con-fig-u-ra-tion \kən-ˌfi-gyə-'rā-shən, ˌkän-, -gə-'\ *n* [LL *configuration-*, *configuratio* similar formation, fr. L *configurare* to form from or after, fr. *com-* + *figurare* to form, fr. *figura* figure] (1646) **1 a** : relative arrangement of parts or elements: as (1) : SHAPE (2) : contour of land ⟨~ of the mountains⟩ (3) : functional arrangement ⟨a small business computer system in its simplest ~⟩ **b** : something (as a figure, contour, pattern, or apparatus) that results from a particular arrangement of parts or components **c** : the stable structural makeup of a chemical compound esp. with reference to the space relations of the constituent atoms **2** : GESTALT ⟨personality ~⟩ — **con-fig-u-ra-tion-al** \-shnəl, -shə-nᵊl\ *adj* — **con-fig-u-ra-tion-al-ly** *adv* — **con-fig-u-ra-tive** \-'fi-gyə-rə-tiv, -'fi-gə-\ *adj*

con-fig-ure \kən-'fi-gyər, *esp Brit* -'fi-gər\ *vt* **-ured; -ur-ing** (1677) : to set up for operation esp. in a particular way ⟨a fighter plane *configured* for the Malaysian air force⟩

¹con-fine \'kän-ˌfīn *also* kən-'\ *n* [ME, fr. MF or L; MF *confines*, pl., fr. L *confine* border, fr. neut. of *confinis* adjacent, fr. *com-* + *finis* end] (15c) **1** *pl* **a** : something (as borders or walls) that encloses ⟨outside the ~s of the office or hospital —W. A. Nolen⟩; *also* : something that restrains ⟨escape from the ~s of soot and clutter —E. S. Muskie⟩ **b** : SCOPE 3 ⟨work within the ~s of a small group —Frank Newman⟩ **2** *a archaic* : RESTRICTION **b** *obs* : PRISON

²con-fine \kən-'fīn\ *vb* **con-fined; con-fin-ing** *vi* (1523) *archaic* : BORDER ~ *vt* **1 a** : to hold within a location **b** : IMPRISON **2** : to keep within limits ⟨will ~ my remarks to one subject⟩ *syn* see LIMIT — **con-fin-er** *n*

con-fined \kən-'fīnd\ *adj* (1772) : undergoing childbirth

con-fine-ment \kən-'fīn-mənt\ *n* (1646) : an act of confining : the state of being confined ⟨solitary ~⟩; *esp* : LYING-IN

con-firm \kən-'fərm\ *vt* [ME, fr. OF *confirmer*, fr. L *confirmare*, fr. *com-* + *firmare* to make firm, fr. *firmus* firm] (13c) **1** : to give approval to : RATIFY **2** : to make firm or firmer : STRENGTHEN **3** : to administer the rite of confirmation to **4** : to give new assurance of the validity of : remove doubt about by authoritative act or indisputable fact — **con-firm-abil-i-ty** \-ˌfər-mə-'bi-lə-tē\ *n* — **con-firm-able** \-'fər-mə-bəl\ *adj*

syn CONFIRM, CORROBORATE, SUBSTANTIATE, VERIFY, AUTHENTICATE, VALIDATE mean to attest to the truth or validity of something. CONFIRM implies the removing of doubts by an authoritative statement or indisputable fact ⟨*confirmed* the reports⟩. CORROBORATE suggests the strengthening of what is already partly established ⟨witnesses *corroborated* his story⟩. SUBSTANTIATE implies the offering of evidence that sustains the contention ⟨the claims have yet to be *substantiated*⟩. VERIFY implies the establishing of correspondence of actual facts or details with those proposed or guessed at ⟨all statements of fact in the article have been *verified*⟩. AUTHENTICATE implies establishing genuineness by adducing legal or official documents or expert opinion ⟨handwriting experts *authenticated* the diaries⟩. VALIDATE implies establishing validity by authoritative affirmation or by factual proof ⟨*validated* the hypothesis by experiments⟩.

con-fir-mand \ˌkän-fər-'mand\ *n* [L *confirmandus*, gerundive of *confirmare*] (1884) : a candidate for religious confirmation

con-fir-ma-tion \ˌkän-fər-'mā-shən\ *n* (14c) **1** : an act or process of confirming: as **a** (1) : a Christian rite conferring the gift of the Holy Spirit and among Protestants full church membership (2) : a ceremony esp. of Reform Judaism confirming youths in their faith **b** : the ratification of an executive act by a legislative body **2 a** : confirming proof : CORROBORATION **b** : the process of supporting a statement by evidence — **con-fir-ma-tion-al** \-shnəl, -shə-nᵊl\ *adj*

con-fir-ma-to-ry \kən-'fər-mə-ˌtōr-ē, -ˌtȯr-\ *adj* (1636) : serving to confirm : CORROBORATIVE

con-firmed \kən-'fərmd\ *adj* (14c) **1 a** : marked by long continuance and likely to persist ⟨a ~ habit⟩ **b** : fixed in habit and unlikely to change ⟨a ~ do-gooder⟩ **2** : having received the rite of confirmation *syn* see INVETERATE — **con-firm-ed-ly** \-'fər-məd-lē\ *adv* — **con-firmed-ness** \-'fər-məd-nəs, -'fərm(d)-nəs\ *n*

con-fis-ca-ble \kən-'fis-kə-bəl\ *adj* (ca. 1736) : liable to confiscation

con-fis-cat-able \'kän-fə-ˌskā-tə-bəl\ *adj* (1863) : CONFISCABLE

¹con-fis-cate \'kän-fə-ˌskāt, kən-'fis-kət\ *adj* [L *confiscatus*, pp. of *confiscare* to confiscate, fr. *com-* + *fiscus* treasury] (ca. 1533) **1** : appropriated by the government : FORFEITED **2** : deprived of property : CONFISCATED

²con-fis-cate \'kän-fə-ˌskāt\ *vt* **-cat-ed; -cat-ing** (1552) **1** : to seize forfeited to the public treasury **2** : to seize by or as if by authority — **con-fis-ca-tion** \ˌkän-fə-'skā-shən\ *n* — **con-fis-ca-tor** \'kän-fə-ˌskā-tər\ *n* — **con-fis-ca-to-ry** \kən-'fis-kə-ˌtōr-ē, -ˌtȯr-\ *adj*

con-fit \kōn-'fē, kȯn-, kän-\ *n* [F, fr. OF, preparation, preserves, fr. pp. of *confire* to prepare — more at COMFIT] (1951) : meat (as goose, duck, or pork) that has been cooked and preserved in its own fat

con-fi-te-or \kən-'fē-tē-ˌȯr, -ər\ *n* [ME, fr. L, lit., I confess, fr. the opening words — more at CONFESS] (13c) : a liturgical form in which sinfulness is acknowledged and intercession for God's mercy requested

con-fi-ture \'kän-fə-ˌchůr, -ˌtyůr, -ˌtůr\ *n* [F, fr. MF, fr. *confit*] (1803) : preserved or candied fruit : JAM

con-fla-grant \kən-'flā-grənt\ *adj* [L *conflagrant-*, *conflagrans*, prp. of *conflagrare* to burn, fr. *com-* + *flagrare* to burn — more at BLACK] (1656) : BURNING, BLAZING

con-fla-gra-tion \ˌkän-flə-'grā-shən\ *n* [L *conflagration-*, *conflagratio*, fr. *conflagrare*] (ca. 1656) **1** : FIRE; *esp* : a large disastrous fire **2** : CONFLICT, WAR

con-flate \kən-'flāt\ *vt* **con-flat-ed; con-flat-ing** [L *conflatus*, pp. of *conflare* to blow together, fuse, fr. *com-* + *flare* to blow — more at BLOW] (1610) **1 a** : to bring together : FUSE **b** : CONFUSE **2** : to combine (as two readings of a text) into a composite whole

con-fla-tion \-'flā-shən\ *n* (15c) : BLEND, FUSION; *esp* : a composite reading or text

¹con-flict \'kän-ˌflikt\ *n* [ME, fr. L *conflictus* act of striking together, fr. *confligere* to strike together, fr. *com-* + *fligere* to strike — more at PROFLIGATE] (15c) **1** : FIGHT, BATTLE, WAR **2 a** : competitive or opposing action of incompatibles : antagonistic state or action (as of divergent ideas, interests, or persons) **b** : mental struggle resulting from incompatible or opposing needs, drives, wishes, or external or internal demands **3** : the opposition of persons or forces that gives rise to the dramatic action in a drama or fiction *syn* see DISCORD

con-flict-ful \'kän-ˌflikt-fəl\ *adj* — **con-flic-tu-al** \kän-'flik-chə-wəl, kən-, -chəl, -shwəl\ *adj*

²con-flict \kən-'flikt, ˌkän-, \ *vi* (15c) **1** *archaic* : to contend in warfare **2** : to show antagonism or irreconcilability — **con-flic-tion** \kən-'flik-shən, kän-\ *n* — **con-flic-tive** \kən-'flik-tiv, ˌkän-, \ *adj*

con-flict-ed \kən-'flik-təd\ *adj* (1967) : having or experiencing an emotional conflict ⟨this unhappy and ~ modern woman —John Updike⟩

conflicting *adj* (1607) : being in conflict, collision, or opposition : INCOMPATIBLE — **con-flict-ing-ly** \-'flik-tiŋ-lē, -ˌflik-\ *adv*

conflict of interest (1951) : a conflict between the private interests and the official responsibilities of a person in a position of trust

con-flu-ence \'kän-ˌflü-ən(t)s, kən-'\ *n* (15c) **1** : a coming or flowing together, meeting, or gathering at one point ⟨a happy ~ of weather and scenery⟩ **2 a** : the flowing together of two or more streams **b** : the place of meeting of two streams **c** : the combined stream formed by conjunction

¹con-flu-ent \-ənt\ *adj* [L *confluent-*, *confluens*, prp. of *confluere* to flow together, fr. *com-* + *fluere* to flow — more at FLUID] (15c) **1** : flowing or coming together; *also* : run together ⟨~ pustules⟩ **2** : characterized by confluent lesions ⟨~ smallpox⟩

²confluent *n* (1850) : a confluent stream; *broadly* : TRIBUTARY

con-flux \'kän-ˌfləks\ *n* [ML *confluxus*, fr. L *confluere*] (1606) : CONFLUENCE

con-fo-cal \(ˌ)kän-'fō-kəl\ *adj* (1867) : having the same foci ⟨~ ellipses⟩ ⟨~ lenses⟩ — **con-fo-cal-ly** \-kə-lē\ *adv*

con-form \kən-'fȯrm\ *vb* [ME, fr. MF *conformer*, fr. L *conformare*, fr. *com-* + *formare* to form, fr. *forma* form] *vt* (14c) **1** : to give the same shape, outline, or contour to : bring into harmony or accord ⟨~ his plans to the rows to the slope of the land⟩ ~ *vi* **1** : to be similar or identical : AGREE **2 a** : to be in agreement or harmony — used with *to* or *with* **b** : to act in accordance with prevailing standards or customs *syn* see ADAPT — **con-form-er** *n* — **con-form-ism** \-'fȯr-ˌmi-zəm\ *n* — **con-form-ist** \-mist\ *n or adj*

con-form-able \kən-'fȯr-mə-bəl\ *adj* (15c) **1** : corresponding in form or character : SIMILAR — usu. used with *to* **2** : SUBMISSIVE, COMPLIANT **3** : following in unbroken sequence — used of geologic strata formed under uniform conditions — **con-form-ably** \-blē\ *adv*

con-for-mal \kən-'fȯr-məl, (ˌ)kän-\ *adj* [LL *conformalis* having the same shape, fr. L *com-* + *formalis* formal, fr. *forma*] (1893) **1** : leaving the size of the angle between corresponding curves unchanged in transformation ⟨~ projection⟩ **2** *of a map* : representing small areas in their true shape

con-for-mance \kən-'fȯr-mən(t)s\ *n* (1606) : CONFORMITY

con-for-ma-tion \ˌkän-(ˌ)fȯr-'mā-shən, -fər-\ *n* (1511) **1** : the act of conforming or producing conformity : ADAPTATION **2** : formation of something by appropriate arrangement of parts or elements : an assembling into a whole ⟨the gradual ~ of the embryo⟩ **3 a** : correspondence esp. to a model or plan **b** : STRUCTURE **c** : the shape and proportionate dimensions esp. of an animal **d** : any of the spatial arrangements of a molecule that can be obtained by rotation of atoms about a single bond — **con-for-ma-tion-al** \-shnəl, -shə-nᵊl\ *adj*

con-for-mi-ty \kən-'fȯr-mə-tē\ *n, pl* **-ties** (15c) **1** : correspondence in form, manner, or character : AGREEMENT ⟨behaved in ~ with her beliefs⟩ **2** : an act or instance of conforming **3** : action in accordance with some specified standard or authority ⟨~ to social custom⟩

con-found \kən-'faůnd, kän-\ *vt* [ME, fr. MF *confondre*, fr. L *confundere* to pour together, confuse, fr. *com-* + *fundere* to pour — more at FOUND] (14c) **1 a** *archaic* : to bring to ruin : DESTROY **b** : BAFFLE, FRUSTRATE ⟨conferences . . . are not for accomplishment but to ~ —J. K. Galbraith⟩ **2** *obs* : CONSUME, WASTE **3 a** : to put to shame : DISCOMFIT ⟨a performance that ~*ed* the critics⟩ **b** : REFUTE ⟨sought to ~ his arguments⟩ **4** : DAMN **5** : to throw (a person) into confusion or perplexity **6 a** : to fail to discern differences between : mix up **b** : to increase the confusion of *syn* see PUZZLE

found-er \-'faůn-dər\ *n* — **con-found-ing-ly** \-diŋ-lē\ *adv*

con-found-ed \kən-'faůn-dəd, (ˌ)kän-', 'kän-, \ *adj* (14c) **1** : CONFUSED, PERPLEXED **2** : DAMNED — **con-found-ed-ly** *adv*

con-fra-ter-ni-ty \ˌkän-frə-'tər-nə-tē\ *n* [ME *confraternite*, fr. MF *confraternité*, fr. ML *confraternitat-*, *confraternitas*, fr. *confrater* fellow

Appendix 2: Definition from AMERICAN HERITAGE ELECTRONIC DICTIONARY (1992)

con·fig·ure (kən-fĭg′yər) *tr.v.* **con·fig·ured**, **con·fig·ur·ing**, **con·fig·ures**. To design, arrange, set up, or shape with a view to specific applications or uses: *an internal security vehicle that was configured for rough terrain.* [Middle English *configuren*, from Old French *configurer*, from Latin *cōnfigūrāre* : *com-*, com- + *figūrāre*, to form (from *figūra*, shape; see **dheigh-** below).]

Appendix 3: U.S. Pat. No. 6,311,365 by Dornier

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(54) Water jet web slitting apparatus

(57) A water jet web slitting apparatus (10) slits a web (16) at a plurality of locations across the web (16) into webs (16a) of smaller width in a winder. The water jet web slitting apparatus (10) utilizes a water jet cutter (20) to slit the web (16). The water jet cutter (20) has a support plate (32) with a pattern of suction apertures (42) located surrounding the cutting aperture (38) of the water jet cutter (20) through which negative pressure is applied to hold the web (16) against the support plate (32) adjacent the water jet cutting apparatus (10) and to prevent the web (16) from fluttering or moving relative to the support plate (32) notwithstanding whether the web (16) is travelling or temporarily at a stopped position. This permits for the water jet to be run continuously without having to be turned off and restarted when the web travel is temporarily stopped and started again because the continually running jet does not re-wet the surface of the web (16) or the edges (16a) cut into the web (16).

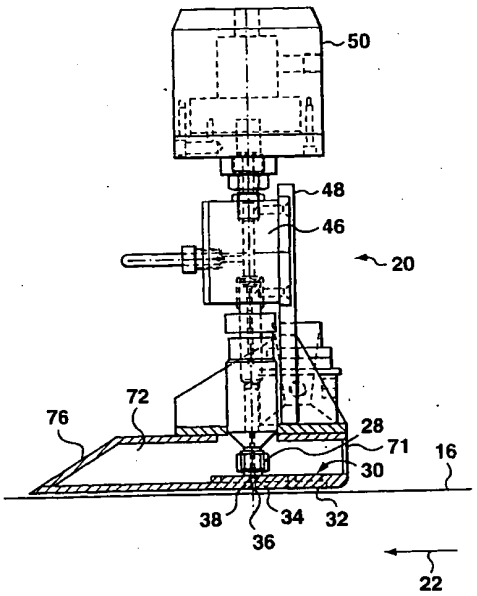

FIG. 2

EP 1 238 766 A2

Description

Field of the Invention

[0001] The present invention relates to a water jet web slitting apparatus for slitting a web normally travelling in a first direction or remaining stationary relative to the slitting apparatus. In particular it relates to a water jet slitting apparatus that cuts the travelling web and does not wet the web during stoppage in web travel.

Background of the Invention

[0002] In the papermaking industry, knives or water jets are commonly employed to cut through the traveling web or sheet. The knives and water jets are used in edge trimming, slicing, cross-cutting, and tail cutting applications within the papermaking machine. However, water jet cutters have rarely been used to as slitters in a re-winder machine where a wound web of paper is unwound, slit in longitudinal directions and re-wound into webs of reduced width.

[0003] One reason for a limited use of water jets to slit the web at the re-winder is due to the fact that the web travel is stopped when a new reel is loaded at the unwind section of the re-winder or the web is spliced. Portions of the paper adjacent the water jet can be seriously damaged if the paper is re-wetted by the water jet.

[0004] While one possible solution might be to turn the water jet off for every stoppage in web travel, this solution is not practical since the jets must be re-started causing a momentary web surface splash before full pressure is achieved. Furthermore, any movement of the web in the direction of web travel effected by changes in web tension while the water jet is off causes an interruption in the cut line in the web. An interruption of the cut line results in tearing of the paper web when the rolls are separated.

[0005] A water jet cutting head currently in use in the papermaking industry typically includes a base plate having a cover plate defining a chamber. The cover plate has one large upstream circular aperture through which air is drawn to hold the sheet against the cover plate. A second circular aperture is located downstream in the direction of sheet travel relative to the first circular aperture. A water jet is emitted through the second aperture to cut the sheet. Air is drawn through the first aperture and the second aperture by a hose contained in the chamber. The hose passes through the base plate to remove the air from the chamber and maintain a vacuum. While such a described water jet cutting head has good cutting performance characteristics, it is unsuitable as a slitter head for a re-winder.

[0006] A water jet cutting apparatus, as disclosed in U.S. patent 6,021,699 issued February 8, 2000 to Roman Caspar, was developed for cutting strip into the edge of a traveling web where an asymmetrical aperture pattern is utilized only on one side of the water jet to discriminately support only that portion of the web to be further processed within the papermaking machine or the sheet processing machine while discarding the strip trimmed from the web. Such a water jet cutter would not function as a slitter on a re-winding machine because it would be subject to the potential wetting problems noted above.

[0007] Accordingly, there is a need to provide a water jet cutting device that can be utilized in the dry end of a papermaking machine and does not wet the web during temporary stoppages in web travel.

Summary of The Invention

[0008] The present invention relates to a water jet web slitting apparatus for slitting a web into a plurality of webs of smaller width. In particular, the present invention utilizes a series of water jet cutters mounted on a support beam traversing the width of the beam and supported from the beam by a support arm. The water jet cutters cut through the travelling web to cut the web into the plurality of smaller webs. The present invention utilizes a support plate structure with the water jet cutter that continues to support the web in engagement with the plate when the web is travelling over the plate or is in a stopped position relative to the plate.

[0009] The water jet cutter has a water jet nozzle which preferably continues to emit the water jet through a cutting aperture in the support plate. This jet continues whether or not the web is travelling across the support plate. In order to support the web and prevent it from fluttering or moving relative to the water jet and the support plate, the support plate has a working surface area in which a plurality of apertures are located. The apertures also surround the water jet cutting aperture. These apertures are referred to throughout the specification as suction apertures because a negative pressure or suction is applied through these apertures to pull the web against the suction apertures and against the working surface area of the support plate. As a result, the web is held against the support plate while the water jet passes through the support plate and the web thereby cutting the web and forming new cut edges for the smaller webs. In the event that the web stops its travel over the support plate, the web is held firmly in place against the support plate both upstream and downstream in the direction of web travel relative to the cutting aperture. Also, the web cut edges downstream from the water jet cut are held firmly against the working surface area of the support plate and are not in direct alignment with the water jet because the jet penetrates or blasts a hole through the web with a high speed jet of extremely small diameter. This jet continues to pass through the web without touching the web when the web remains stationary and does not re-wet the web.

[0010] Preferably the suction apertures are arranged in a symmetrical pattern surrounding the water jet cutting aperture both upstream and downstream in the di-

rection of web travel. The suction applied to the suction apertures may be chosen to cause the support plate to grab or hold the web against the plate upstream, downstream and on both sides of the water jet cutting aperture. Hence, the hole pattern arrangement of the present invention provides a uniform suction force about the cutting aperture preventing the cutting edges of the web and the web from fluttering relative to the working surface area.

[0011] The water jet web slitting apparatus, including the water jet of the present invention, may be utilized as a slitter on a re-winder machine where the web is to be slit into a plurality of webs and wound onto separate rolls. Further, because web travel is known to stop to permit separate rolls to be exchanged, the location of the cut is immaterial because it does not result in any damage to the web. For example, if the web is damaged by re-wetting, there is wasted web that has to be trimmed or discarded from the new separate rolls. The present invention is not subject to these problems.

[0012] In accordance with the present invention, the water jet web slitting apparatus comprises a plurality of water jet cutters. Each water jet cutter has a support plate having a working surface area against which the web is supported. The support plate has a cutting aperture passing through the working surface area and a predetermined number of suction apertures passing through the working surface area arranged in a pattern on both sides of the cutting aperture in a first direction of web travel. The cutter has a water jet nozzle located adjacent the cutting aperture for directing a water jet through the cutting aperture and away from the working surface area. The cutter has suction means for applying suction through the suction apertures to draw the web towards the suction apertures and into engagement with the working surface area whereby the web is supported by the support plate on upstream, downstream and both sides of the cutting aperture in the first direction of web travel. The suction applied by the suction means prevents fluttering movement of the web relative to the working surface area to permit the water jet passing through the cutting aperture to cut through the web to form cut edges and to prevent wetting of the web surface and cut edges notwithstanding whether the web is normally travelling in the first direction or is remaining stationary relative to the working surface area of the slitting apparatus.

[0013] It should be understood that the amount of suction applied to the suction apertures depends on the shape and size of the apertures which preferably are round. The cutting aperture is considerably smaller than the suction apertures because the dimension of the jet is relatively small and it is preferred that substantially no suction be applied through the cutting aperture. The water jet nozzle is preferably located closely adjacent the cutting aperture on the opposite side of the support place from the web to block the cutting aperture preventing suction from being applied to the cutting aperture. The smaller the cutting aperture, the better the jet cuts through the web and less are the risks of backsplash occurring. The cutting aperture may have a diameter in the range of 0.05 to 3 mm.

[0014] The working area is that area defined around the suction apertures on the support plate and in-between the suction apertures. The working area may extend further beyond the perimeter as defined by the suction apertures by an amount which would be proportional to the amount of suction applied through the suction apertures. In accordance with the present invention, the support plate preferably has a section downstream from the cutting aperture and in line therewith to which suction is not applied. It is across this section that the cut edges of the web pass.

[0015] The suction may be applied to the suction apertures by means of hoses applied directly to the suction apertures or by having an enclosed chamber located behind the support plate in which the water jet nozzle is mounted and from which a suction hose is attached to either the rear surface or side surfaces of the support plate to create a negative pressure within the chamber to draw air in through the suction apertures.

[0016] Preferably, the suction aperture pattern comprises a series of six suction apertures, four of which are located immediately prior to the cutting aperture in the downstream direction of the travel of the web and two apertures located downstream relative to the cutting aperture. The suction apertures are preferably aligned on either side of the cutting aperture whereby at least the downstream suction apertures relative to the cutting apertures have a land area or longitudinal working surface section that is not interrupted by the pattern of the suction apertures. This prevents any suction being applied to the web cut edges as the web travels past the cutting aperture. Alternatively, it should be understood that the present invention provides a water jet cutter which may be placed either above or at any angle not more than 90 degrees from the vertical relative to the travel of web.

Brief Description of The Drawings

[0017] For a better understanding of the nature and objects of the present invention reference may be had to the accompanying diagrammatic drawings in which:

Figure 1 is a perspective view showing the water jet web slitting apparatus of the present invention adapted for slitting a web into a plurality of webs having smaller width by the use of the water jet cutter of the present invention;

Figure 2 is a side view of the water jet cutting apparatus of the present invention;

Figure 3 is a bottom view of the support plate utilized in the water jet cutting apparatus of the present invention; and

Figure 4 is a top view of the support plate chamber mechanism of the water jet cutting apparatus of the

present invention.

Detailed Description of The Drawings

[0018] Referring Figure 1, there is shown a water jet web slitting apparatus 10 having a support beam 12 and stands 14 for supporting the support beam 12. The support beam 12 spans across the width of the web 16. The support beam 12 includes a plurality of arms 18 which hold a water jet cutting apparatus or cutter generally shown at 20. It should be understood that the water jet cutting apparatus 20 include hoses and pneumatic controls (not shown) which will pass down the arms and across the beam so as to be supported away from the travelling web 16. In the present invention, the web travels in the first direction shown by arrow 22 and each of the cutters 20 slits the web 16 at slits or cut edges 24 so that the web 16 now has been cut into a plurality of separate webs 16a having a width which is less than the overall of the web 16.

[0019] It should be understood that this water jet web slitting apparatus 10 typically is utilized in a re-winder machine where a wound roll of paper is un-wound, slit in a longitudinal direction, and re-wound into webs of reduced width. The web 16 is slit by the water jet slitters 20 and the slits 24 become the new edges of each of the smaller webs 16a. The webs 16a are re-wound onto separate winding rolls (not shown). In the practice of the present invention, the web 16 normally travels in the direction of arrow 22 and is stopped from time to time to remove separate wound rolls from the downstream section of the re-winder.

[0020] Referring to Figures 2, 3 and 4, the construction of each of the water jet cutters 20 for slitting slits 24 in web 16 is shown. The water jet cutter 20 has a nozzle 28 located within a chamber 30. The nozzle 28 is mounted relative to a support plate 32 behind a working surface area 34. A water jet 36 pushes through the aperture of cutting aperture 38 in the working surface area 34. Cutting aperture 38 has a preferred diameter of 0.08 to 3 mm. The nozzle 28 is positioned closely adjacent the cutting aperture to block the cutting aperture and prevent or limit suction being applied through cutting aperture 38.

[0021] Referring to Figure 3, the working surface area 34 is shown within the perimeter 40 in the dotted lines and surrounds the cutting aperture 38. Also located within the perimeter 40 of the working surface area 34 are a series of suction apertures 42. The suction apertures 42 are aligned in a symmetrical pattern of two rows of three apertures in the direction 22 of web travel. The suction apertures 42 are circular in shape and have a preferred diameter of 20 mm, which is considerably larger than the smaller diameter of cutting aperture 38. Each row of three suction apertures 42 is aligned in the direction 22 of web travel on opposite sides of the water jet cutting aperture 38. Furthermore, four suction apertures 42 are located upstream of the water jet cutting aperture 38 and two suction apertures 42 are located downstream in the direction 22 of web travel relative to the water jet cutting aperture 38. The suction apertures 42 hold the web 16 against the working surface area 34 to permit the water jet 36 to cut through the web 16.

[0022] The shape of the suction apertures 32 may vary from a circular shape, however for the purposes of the present invention circular apertures are preferred because cutting these holes is less costly and the suction applied across the aperture is relatively uniform. Two additional apertures 42 are positioned upstream than downstream of the water jet cutting aperture 38 insuring the working surface area 34 to grip or draw the web 16 against this working surface area 34 prior to cutting through the web.

[0023] The area 60 immediately downstream of the cutting aperture 38 between the suction apertures 42 provides a land of longitudinal working surface section that is not interrupted by the suction aperture pattern such that no suction is applied to the cut edges or slits 24 of the web 16a.

[0024] The apparatus 10 is further provided with a suction hose 70 shown in Figure 4 which comes in through the rear wall or top wall 72 of the chamber 30 to draw or create a vacuum or negative pressure area within chamber 30 so that suction is drawn through the suction apertures 42.

[0025] The support plate 32 is separated from a top wall 72 by a front wall 71, side walls 74 and angled top or back wall 76. The side walls 74 preferably angle outwardly or diverge from each other as the side walls 74 extend away from the support plate 32 towards the top wall 72. Thus as the sheets or web 16 widens out, it passes smoothly underneath the cutting heads without catching. The back wall 76 is angled downwardly into the web as it extends from the top wall 72 to the support plate 32. The sloping back wall 76 improves air flow over the top wall 72 of air moving with the traveling web 16 as the web is drawn over support plate 32. The improved air flow is less turbulent reducing "low pressure" areas where dust particles might first collect.

[0026] The water jet cutter 20 further includes conduits 46 passing through the neck 48 and upper body 50 of the cutter for connection with the arms 18 of the beam 12.

[0027] It should be understood that the arms 18 of the beam 12 may be adjusted across the beam to adjust the width of the slots or the webs being cut from the master web 16. However, it is not a feature of the present invention that this adjustment is a continuous adjustment that occurs during the web cutting or slitting process. On the other hand, the position of the cutters 20 are adjusted prior to the cutting operation and remain in that position during the cutting operation for a given web 16 to be slit into smaller webs 16a.

[0028] It should be understood that alternative embodiments of the present invention may be readily apparent to a person skilled in the art in view of the above

description for the preferred embodiments of this invention. Accordingly, the scope of the present invention should not be limited to the teachings of the preferred embodiments and should be limited to the scope of the claims that follow.

Claims

1. A water jet web slitting apparatus (10) for slitting a web (16) normally travelling in a first direction (22) relative to the slitting apparatus (10) and capable of remaining stationary relative to the slitting apparatus (10), the apparatus (10) chaacterized by:

   a) a support plate (32) having a working surface area (34) against which the web (16) is supported, the support plate (32) having a cutting aperture (38) passing through the working surface area (34) and a predetermined number of suction apertures (42) passing through the working surface area (34) arranged in a pattern on both sides of the cutting aperture (38) in the first direction (22) of web travel;
   b) a water jet nozzle (28) located adjacent the cutting aperture (38) for directing a water jet through the cutting aperture (38) and away from the working surface area (34); and,
   c) suction means (70) for applying suction through the suction apertures (42) to draw the web (16) towards the suction apertures (42) and into engagement with the working surface area (34) whereby the web (16) is supported by the support plate (32) on upstream, downstream and on both sides of the cutting aperture (38) in the first direction (22) of web travel, and the suction applied by the suction means (70) preventing fluttering movement of the web (16) relative to the working surface area (34) to permit the water jet passing through the cutting aperture (38) to cut through the web (16) to form cut edges (24) and to prevent wetting of the web surface and cut edges (24) notwithstanding whether the web (16) is normally travelling in the first direction (22) or is remaining stationary relative to the working surface area (34) of the slitting apparatus (10).

2. The water jet web slitting apparatus (10) of claim 1 further **characterized in that** the pattern of suction apertures (42) is uniform and substantially in a symmetrical pattern providing substantially uniform suction force on the web (16) over the working surface area (34) and around the cutting aperture (38).

3. The water jet web slitting apparatus (10) of claim 1 further **characterized in that** the working surface area (34) has a longitudinal working surface section (60) downstream from the cutting aperture (38) in the first direction (22) of web travel whereby limited suction is applied between the web cut edges (24).

4. The water jet web slitting apparatus (10) of claim 1 further **characterized in that** the suction apertures (42) are considerably larger than the water jet cutting aperture (38).

5. A water jet web slitting apparatus (10) for slitting a web (16) normally travelling in a first direction (22) relative to the slitting apparatus (10) and capable of remaining stationary relative to the slitting apparatus (10), the apparatus (10) **characterized by** :

   a) a support plate (32) having a working surface area (34) against which the web (16) is supported;
   b) the support plate (32) having a cutting aperture (38) passing through the working surface area (34) whereby the web (16) is supported by the support plate (32) on upstream, downstream and on both sides of the cutting aperture (38) in the first direction (22) of web travel;
   c) a water jet nozzle (28) located adjacent the cutting aperture (38) for directing a water jet through the cutting aperture (38) and away from the working surface area (34) and the water jet nozzle (28) substantially blocking the cutting aperture (38) save for the emission of the water jet;
   d) the support plate (32) having a predetermined number of suction apertures (42) passing through the working surface area (34) and arranged in a pattern across the working surface area (34) that surrounds the cutting aperture (38); and,
   f) suction means (70) for applying suction through the suction apertures (42) to draw the web (16) towards the suction apertures (42) and into engagement with the working surface area (34), and the suction applied by the suction means (70) preventing fluttering movement of the web (16) relative to the working surface area (34) to permit the water jet passing through the cutting aperture (38) to cut through the web (16) to form cut edges (24) and to prevent wetting of the web (16) and cut edges (24) notwithstanding whether the web (16) is normally travelling in the first direction (22) or is remaining stationary relative to the working surface area (34) of the slitting apparatus (10).

6. The water jet web slitting apparatus (10) of claim 5 further **characterized in that** the pattern of suction apertures (42) is a symmetrical pattern providing substantially uniform suction force on the web (16) over the working surface area (34) and around the

cutting aperture (38).

7. The water jet web slitting apparatus (10) of claim 6 further **characterized in that** the working surface area (34) has a longitudinal working surface section (60) downstream from the cutting aperture (38) in the first direction (22) of web travel whereby no suction is applied between the web cut edges (24)..

8. The water jet web slitting apparatus (10) of claim 6 further **characterized in that** the suction apertures (42) have a diameter that is considerably larger than the water jet cutting aperture (38).

9. The water jet web slitting apparatus (10) of claim 6 further **characterized in that** the working surface area (34) has a perimeter (40) within which the web (16) is supported and the pattern of suction apertures (42) extends outwardly from the cutting aperture (38) to the perimeter (40) of the working surface area (34).

10. A water jet web slitting apparatus (10) for slitting a web (16) normally travelling relative to the slitting apparatus (10) and capable of remaining stationary relative to the slitting apparatus (10) into a plurality of webs (16a) of smaller width,
characterized by:

a support beam (12) traversing the width of the web (16);
a plurality of support arms (18) carrying a water jet cutter (20) and mounted along the support beam (12) to define the width of the smaller webs (16a) to be cut;
the water jet cutter (20) comprising:

a) a support plate (32) having a working surface area (34) against which the web (16) is supported, the support plate (32) having a cutting aperture (38) passing through the working surface area (34) and a predetermined number of suction apertures (42) passing through the working surface area (34) arranged in a pattern on both sides of the cutting aperture (38) in the first direction (22) of web travel;
b) a water jet nozzle (28) located adjacent the cutting aperture (38) for directing a water jet through the cutting aperture (38) and away from the working surface area (34); and,
c) suction means (70) for applying suction through the suction apertures (42) to draw the web (16) towards the suction apertures (42) and into engagement with the working surface area (34) whereby the web (16) is supported by the support plate (32) on upstream, downstream and on both sides of the cutting aperture (38) in the first direction (22) of web travel, and the suction applied by the suction means (70) preventing fluttering movement of the web (16) relative to the working surface area (34) to permit the water jet passing through the cutting aperture (38) to cut through the web (16) to form cut edges (24) and to prevent wetting of the web surface and cut edges (24) notwithstanding whether the web (16) is normally travelling in the first direction (22) or is remaining stationary relative to the working surface area (34) of the slitting apparatus (10).

11. The water jet web slitting apparatus (10) of claim 10 further **characterized in that** the pattern of suction apertures (42) is uniform and substantially in a symmetrical pattern providing substantially uniform suction force on the web (16) over the working surface area (34) and around the cutting aperture (38).

12. The water jet web slitting apparatus (10) of claim 11 further **characterized in that** the working surface area (34) has a longitudinal working surface section (60) downstream from the cutting aperture (38) in the first direction (22) of web travel whereby no suction is applied between the web cut edges (24).

13. The water jet web slitting apparatus (10) of claim 12 further **characterized in that** the suction apertures (42) have a diameter that is considerably larger than the water jet cutting aperture (38).

14. The water jet web slitting apparatus (10) of claim 10 further **characterized in that** the water jet nozzle (28) substantially blocks the cutting aperture (38) save for continuous emission of the water jet.

15. The water jet web slitting apparatus (10) of claim 1 further **characterized in that** the support plate (32) has a front wall (71), two side walls (74), a back wall (76) and a top wall defining a chamber (30) into which suction is applied to draw a negative pressure through the suction apertures (42); and the back wall (76) sloping outwardly away from the top wall to the support plate (32) in the first direction (22) of web travel.

16. The water jet web slitting apparatus (10) of claim 5 further **characterized in that** the support plate (32) has a front wall (71), two side walls (74), a back wall (76) and a top wall defining a chamber (30) into which suction is applied to draw a negative pressure through the suction apertures (42); and the back wall (76) sloping outwardly away from the top wall to the support plate (32) in the first direction (22) of

web travel.

17. The water jet web slitting apparatus (10) of claim 10 further **characterized in that** the support plate (32) has a front wall (71), two side walls (74), a back wall (76) and a top wall defining a chamber (30) into which suction is applied to draw a negative pressure through the suction apertures (42); and the back wall (76) sloping outwardly away from the top wall to the support plate (32) in the first direction (22) of web travel.

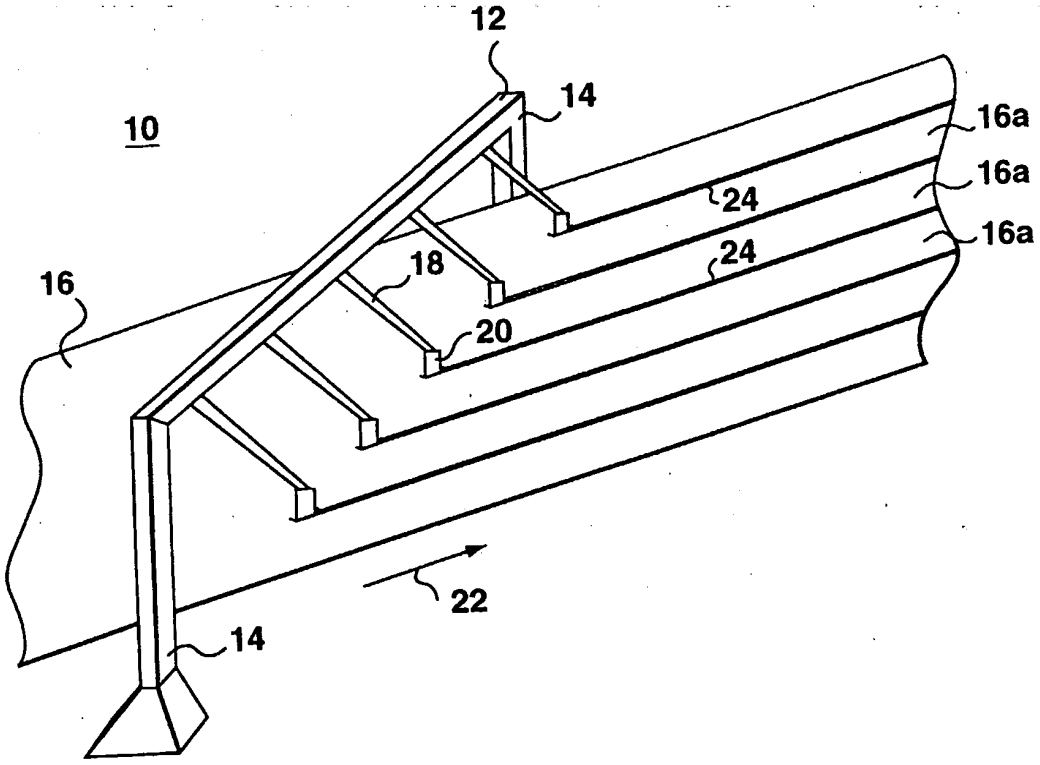

FIG .1

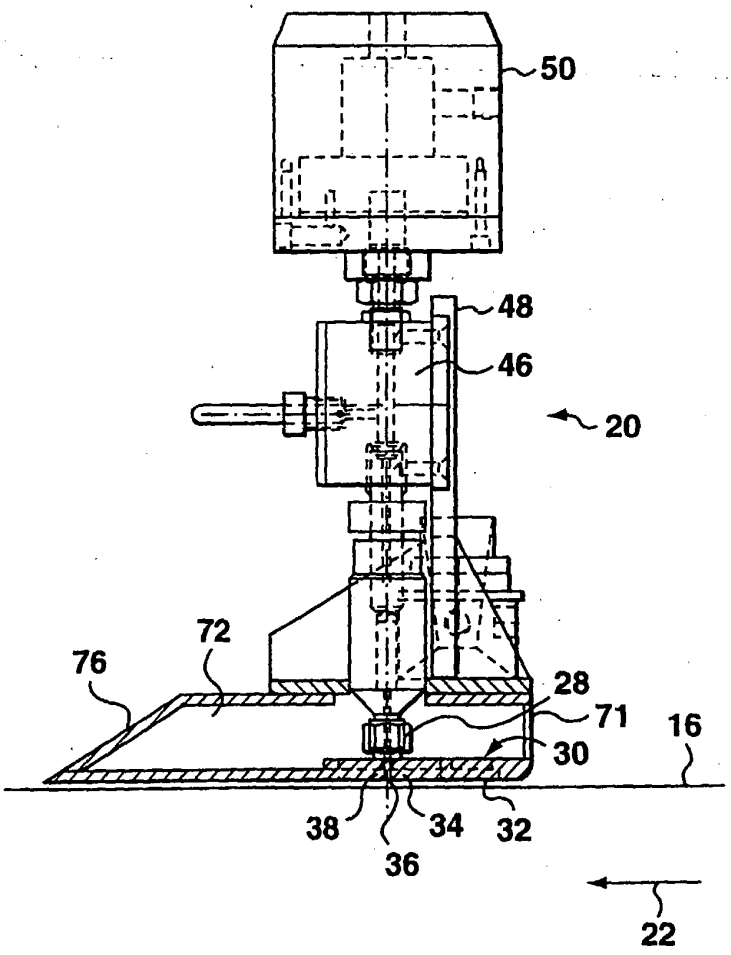

FIG. 2

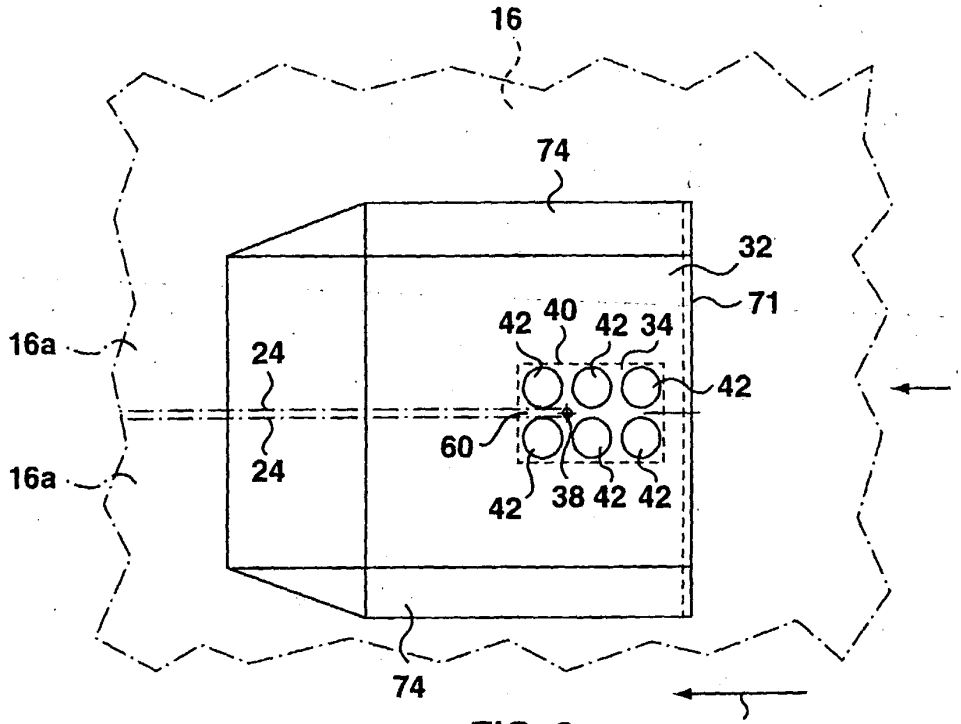
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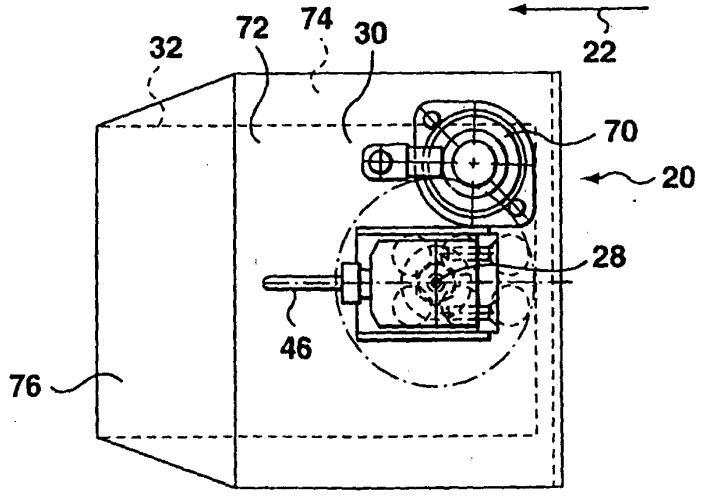
FIG. 3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20
28
46
76

FIG. 4